This application is a div of Ser. No. 09/899,467 filed Jul. 5, 2001, now U.S. Pat. No. 6,712,568 which claims benefit of Provisional Appl No. 60/216,444 filed Jul. 6, 2000.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method and apparatus for treating fluids and, more particularly, but not by way of limitation to a vortex nozzle assembly including improved vortex nozzles.

2. Description of the Related Art

U.S. Patent No. 4,261,521 discloses a vortex nozzle assembly constructed with a pair of vortex nozzles positioned within a housing in opposed relationship. The housing maintains the axial alignments of the nozzles and their respective nozzle exits and, further, introduces fluid into the vortex nozzles. The fluid enters an interior tapered vortex tube of each vortex nozzle through a straight, round, port tangent to a toroidal cavity. The toroidal cavity is adjacent to a large end of the tapered, conical vortex tube, which is normal to the nozzle axis. The fluid departs from this toroidal section and progresses spirally out toward a nozzle exit as more fluid continuously enters the port. The transition from the toroidal shape to the conical shape is critical. If the inside edge of the cone is tangent to the outside of the toroid, the fluid exits too quickly to form complete coverage of the interior of the vortex tube. Conversely, if the inside edge of the cone starts at the bottom quadrant of the torrous, the exiting fluid interferes with the incoming flow and causes much turbulence.

As fluid is forced spirally out each vortex tube, centrifugal energy flattens a circular section of fluid against the side of the tapered vortex tube. This action accelerates the fluid as it spirals out toward the exit, creating a void inside the vortex tube chamber. When the fluid exits the walls of the vortex tube, it accelerates radially forming a hollow fluid cone. The hollow fluid cone from one vortex nozzle impacts with the hollow fluid cone from the other vortex nozzle.

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